# 1. INTRODUCTION

This report, prepared by Golder Associates Inc. (Golder) for the Landsburg Mine Potentially Liable Party Group (PLP Group), presents the results of the Landsburg Mine Site Remedial Investigation (RI) and Feasibility Study (FS). The Landsburg Mine site is a State of Washington Priority Listed site under the auspices of the Model Toxics Control Act (MTCA), Chapter 70.105D RCW. Pursuant to Ecology's authority under MTCA, Ecology issued Agreed Order No. DE 983TC-N273 (WDOE 1993a) on July 21, 1993 which directed the Landsburg PLP Group to conduct this RI/FS. This RI/FS report has been prepared in accordance with the Agreed Order and the requirements of WAC 173-340-350 State Remedial Investigation and Feasibility Study.

Under the terms of the Agreed Order, the Landsburg RI/FS was to be conducted using a phased approach, if necessary. The scope of work for the first phase was outlined in the *Landsburg Phase I Remedial Investigation/Feasibility Study (RI/FS) Work Plan* (Golder 1992a) which was prepared by the PLP Group, approved by Ecology, and incorporated by reference into the Agreed Order. The scope of work for a Phase II RI/FS, if one was required, would be negotiated by Ecology and the PLPs upon completion of the Phase I RI/FS. However, during the performance of the Phase I RI, it became apparent to the PLP Group that additional RI phases were not warranted to adequately characterize site conditions, and approval was received from Ecology to finalize the FS without a Phase II RI. This document, therefore, represents a complete and final RI and FS set of documents that will be sufficient to enable Ecology to make decisions regarding the final Cleanup Action Plan (CAP) for the Landsburg Mine site.

## 1.1 Purpose and Rationale

The objective of the RI/FS process is to gather sufficient information to support an informed risk management decision regarding disposition of the site consistent with the requirements of WAC 173-340-360. Data are required to determine whether significant human health or environmental risk is posed by the site and to select the most appropriate remedial alternative. The key concept in the RI/FS process is to gather sufficient information to meet the data needs while recognizing that removing all uncertainty is not necessary or achievable.

The Work Plan (Golder 1992a) and support project plans together with *the Conceptual Model of the Landsburg Mine Site* (Golder 1992b) provide the necessary rationale and details for implementation of the RI/FS. The conceptual model (GAI 1992b) presented data available at the time of Work Plan preparation for project scoping and summarized the understanding of site conditions available at that time. The support project plans include: Health and Safety Plan (HSP), Quality Assurance Project Plan (QAPP), and Data Management Plan (DMP).

## 1.2 Background

The Landsburg Mine site consists of a former underground coal mine located approximately 1.5 miles northwest of Ravensdale in southeast King County, Washington. The site is located directly south and east of the S.E. Summit-Landsburg Road and north of the Kent-Kangley Road. The Cedar River passes within approximately 500 ft of the site to the north. The location

of the site in the Seattle, Washington area is shown in Figure 1-1. Figures 1-2 and 1-3 depict the immediate site vicinity.

The mine site occupies property owned by Palmer Coking Coal Company (PCC) and Plum Creek Timber Company, L.P. and is located within sections 24 and 25, Township 22 N., Range 6 E. The Landsburg Mine site was defined in the Work Plan (Golder 1992a) as land extending 400 feet on either side of the mine trench lineation and bounded by the Summit-Landsburg Rd. to the north and the electrical transmission line easement to the south. The Study Area for the site is depicted in Figures 1-2 and 1-3. Property boundaries for the site are shown in Figure 1-4.

PCC operated an underground coal mine known as the Landsburg Mine from the late 1940s until approximately 1975. The Landsburg Mine consisted of two adjacent coal seams: the Landsburg Seam and the Rogers Seam. Mining began in the Landsburg Seam in the late 1940s and continued until 1959. In 1959, mining of the Landsburg Seam ceased and mining began on the Rogers Seam. The Rogers Seam was mined from 1959 until 1975. The two seams are separated by about 600 ft. In addition to these two seams, mining has also been conducted at the nearby Frasier seam. This seam, located some 800 ft northwest of the Rogers Seam, was mined intermittently from the late 1800s to the mid 1940s.

The mined section of the Rogers coal seam has a near vertical dip and consists of coal and interbedded shale approximately 16 ft wide. The mined section is about a mile in length. Mining occurred at depths of up to 750 feet using a mining method locally called "booming" which followed the coal seam vertically. As a result of underground mining of the Rogers Seam, a subsidence trench developed on the land surface above the mine workings. The dimensions of the trench vary, from about 60 to 100 feet wide, between 20 to 60 feet in depth and about 3/4 mile in length.

Based on currently available information, this trench was used in the late 1960s to the late 1970s for disposal of various industrial waste materials, construction materials, and land-clearing debris. Drums, liquid from tanker trucks and other industrial materials were disposed of in the northern portion of the trench. Disposal of land clearing debris continued until the early 1980s. Currently, the site is secured by a fence and locked gate which encloses the northern portion of the trench where disposal occurred.

Several preliminary environmental investigations have been performed at the site. These investigations have included a limited soil gas survey (Applied Geotechnology 1990), sampling of area private wells (WDOH 1992), sampling surface water emanating from mine portals (Geraghty and Miller 1990), and limited sampling of ponded surface water, drum contents and soils for a site hazard assessment (Ecology and Environment [E&E] 1991). These investigations have detected hazardous substances, including volatile and semi-volatile organic compounds, PCBs, cyanide and metals, in drum contents, adjacent soils and ponded surface water within the trench. These hazardous substances have not been detected in adjacent private and public supply wells, mine portal groundwater discharge or soil gases.

An Expedited Response Action (ERA), involving the removal of over 100 55-gallon drums, was undertaken by the Landsburg PLP Steering Committee (PLPSC) during the summer of 1991 (Landsburg PLP Steering Committee 1991). Additional data and information on the site are available in the form of mine maps, agency files, and interviews with site personnel.

## 1.3 Overview of the RI/FS Process

In accordance with EPA guidance (EPA 1988), an RI/FS is generally conducted in the following steps:

RI Process

1. Develop and implement an RI program.

2. Present and evaluate the RI data.

3. Evaluate the physical, ecological and social setting of the site. This evaluation uses data obtained during the RI as well as other available information.

4. Determine the nature and extent of contamination in environmental media.

5 Estimate the future fate and transport of contaminants in the environment.

6. Evaluate risks for human health and ecological exposure to contamination through the performance of a baseline risk assessment.

FS Process

7. Establish remedial action objectives (RAOs) (cleanup goals) for contaminants and media of interest. These objectives are developed based on the findings of the baseline risk assessment, and the applicable or relevant and appropriate requirements (ARARs).

8. Identify the applicable general response actions (e.g., containment, removal, and treatment).

9. Estimate the areas and volumes of contaminated media that exceed the remedial action objectives based on information developed in the RI.

10. Identify and screen the potentially applicable remediation technologies for each contaminated media to obtain a set of feasible technologies for use in achieving RAOs.

11. Assemble the retained technologies into remediation alternatives that cover the full range of possible response actions. The alternatives are then screened based on effectiveness, implementability, and cost to eliminate alternatives that are impractical, infeasible or too costly relative to the other alternatives.

12. Develop and evaluate the retained alternatives in sufficient detail to support selection of a site remedy.

In accordance with the Agreed Order (WDOE 1993a), this report consists of the Final RI and FS for the Landsburg Mine site. The RI portions of this report, together with the Work Plan (Golder 1992a) contain steps 1 through 6. Data collected during the RI include four quarters of groundwater monitoring performed at site monitoring wells and selected private wells in the Study Area, as well as soil and surface water sampling in the vicinity of the trench. With respect to step 6 (Baseline Risk Assessment), a formal baseline risk assessment has not been conducted as part of this RI due to the very limited extent of chemical contamination which was found in the RI. The Landsburg PLP Group received approval from Ecology (South 1994) to conduct an abbreviated risk assessment, consisting essentially of comparisons of site data to risk-based regulatory criteria (MTCA cleanup levels).

The FS portions of this report consist of steps 7 through 12 (outlined above) which includes all the steps necessary in a final FS to support selection of a site remedy.

## 1.4 Report Organization

This RI/FS report is organized into the following sections:

- **Chapter 1, Introduction** - This section.

- **Chapter 2, Data Collection Activities** - This section presents the RI data collection activities by the tasks presented in the Work Plan (Golder 1992a).

- **Chapter 3, Physical Characteristics of the Site** - This section describes the physical characteristics of the site and Study Area on the basis of previous studies, referenced information, and the data collected as part of the RI. Physical characteristics discussed include the regional and site geology, hydrogeology, hydrology, and meteorology as well as local ecological and social characteristics and the condition of the Mine itself.

- **Chapter 4, Applicable or Relevant and Appropriate Requirements (ARARs)** - This section presents the ARARs for the site which are considered in development and evaluation of remedial alternatives.

- **Chapter 5, Nature and Extent of Chemical Constituents Exceeding ARARs** - This section presents the results of the sampling and chemical analysis conducted for the RI and compares the data to ARARs to determine whether past waste disposal at the mine has resulted in a significant risk to human health and the environment.

- **Chapter 6, RI Summary -** An overall summary and the conclusions of the RI are provided in this section.

- **Chapter 7, Remedial Action Objectives and Assembly of Remediation Alternatives** - This chapter develops remedial action objectives (RAOs) for the site and assembles and screens remediation technologies. The retained technologies are assembled into remediation alternatives, and the alternatives are screened to obtain the alternatives for detailed evaluation.

- **Chapter 8, Development of Alternatives** - This chapter consists of detailed development and description of the retained remediation alternatives.

- **Chapter 9, Evaluation of Alternatives** - This chapter consists of detailed evaluation of the remediation alternatives to support selection of a site remedy.

- **Chapter 10, References** - This section cites the documentation referenced in the body of this report.

- **Appendices** - Supporting RI and FS data are included in Appendices A thru K.

Chapters 1 through 10 of the report, along with tables and figures, are included as Volume I. Volume II consists of the appendices.